TELEPHONY

The Journal of the Telephone Industry

MARCH 2, 1946

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Flashes and Plugs

JAP TELEPHONES Nearly half of the telephones in Japan were destroyed by the war. Compared with a peak of 1,592,157 telephones before war damages were suffered, there were 840,245 operating when an inventory of the telephone industry was made by Allied Headquarters. Tokyo, with 46 exchanges and 199,962 telephones suffered 157,430 (79 per cent) damaged or destroyed. Seven exchanges have been discontinued due to damage. Twenty-eight exchanges had 80 per cent or more of their telephones destroyed or damaged.

* * *

RELAYS Seventy-four thousand turns of wire, smaller than a strand of human hair, are used on certain coils for telephone switchboard relays.

* * *

HEADSETS Tiny nylon-insulated coils for telephone headsets withstand greater extremes of heat and cold without cracking or losing shape than any other type.

* * *

ARMY The armed services have trained more than 500,000 radar and radio technicians, operators and repairmen.

* * *

DIRECTORY Chicago has the largest single telephone book in the country. A recent issue contained 1,736 pages, but the alphabetical sections of New York City's five borough directories have altogether some 3,100 pages.

* * *

JAP MANUFACTURERS Twenty-two factories in Japan, operated by 15 companies, currently are in existence for the manufacture of telephone apparatus, central office equipment and telephone plant equipment other than wire or cable. However, the machinery and labor of many of the factories are dispersed at present. The industry considered it probable that when existing machinery is again installed and manned with adequate labor, present production capacities could be doubled. The monthly schedule of estimated production: 53,500 telephones, 2,406 telegraph sets, 45,580 manual switchboard lines, 18,000 switch gear lines, 75 repeaters and five sets of carrier equipment.

* * *

TOLL More than half of all long distance and toll calls in the United States start or end in private branch exchange switchboards.

* * *

LONG DISTANCE Although the telephone was invented on the Atlantic seaboard, the Ridge Telephone Co., located in the hydraulic gold mining fields of Nevada County, Calif., built and operated the first long distance telephone system in the world. The line was built in 1878 and the instruments used were Edison telephones.

* * *

JOHN REIS It is said that if John Phillip Reis, who constructed apparatus in 1860 which he claimed transmitted sound and human speech, had equipped his transmitter with an adjustment spring so as to obtain variable pressure of the electrodes in constant contact —he would have preceded Bell by 15 years as the inventor of the telephone.

* * *

"TELEPHONE" The first known use of the word "telephone" was made in 1796 by a German writer Huth, of Berlin. However, Huth had nothing to do with the birth of the telephone. The word telephone is generally credited to Sir Charles Wheatstone, physicist and pioneer in telegraphy, who used it in 1840.

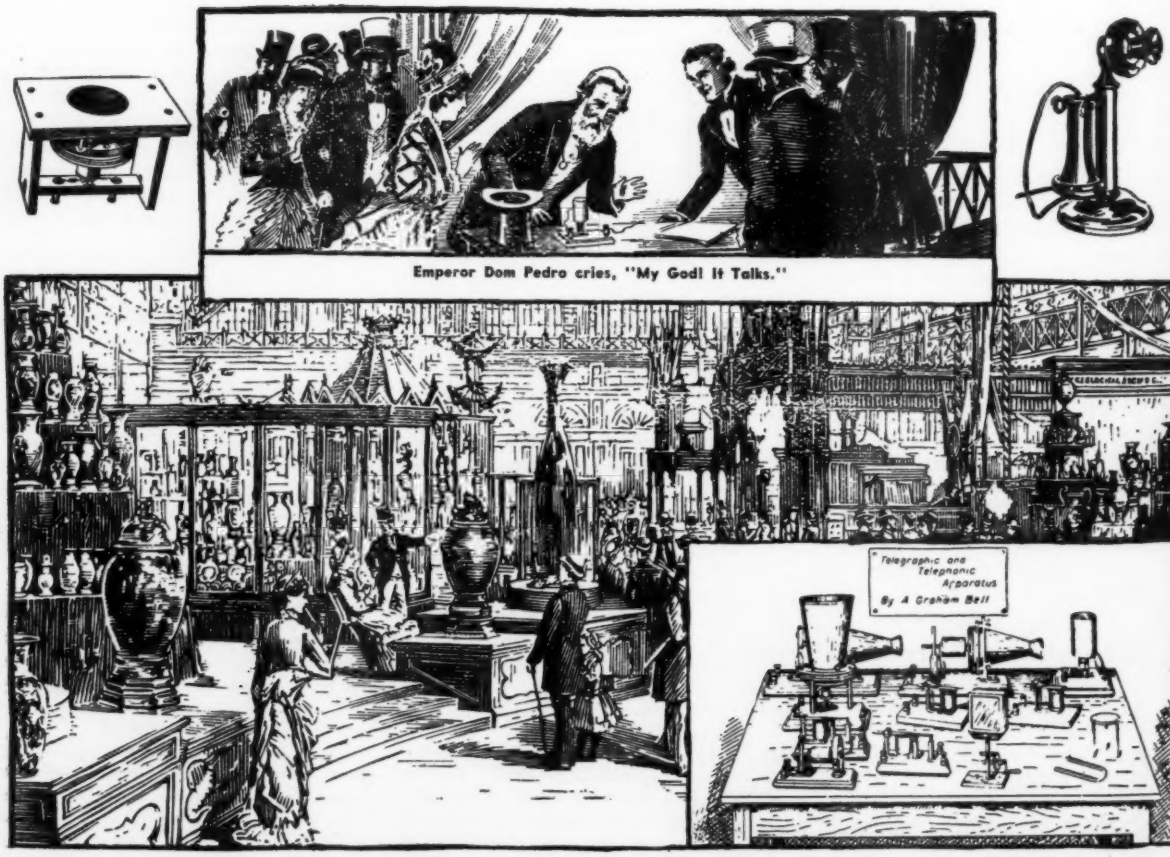
70 YEARS

MARCH 10
1876 • 1946

OF TELEPHONE PROGRESS

By JOHN G. REYNOLDS
Associate Editor of TELEPHONY

From March 10, 1876, when Dr. Bell transmitted to Mr. Watson the first telephone message, the story of the telephone industry has been one of constant progress. Outstanding in the 70 years just ending has been the constant aim of the entire industry to give the best possible service and the use of the human touch in dealing with subscribers. History of the telephone business in this country should provide inspiration to young men in the industry.



Emperor Dom Pedro cries, "My God! It Talks."

Alexander Graham Bell exhibited his speaking telephone at the Centennial Exposition, 1876, in Philadelphia, and won recognition from scientists.

BECAUSE of the remarkable efficiency of the American telephone industry there is scarcely a place on the globe that is not within calling distance of practically every house or office in the country. Yet, it was only 70 years ago, on March 10, 1876, that the telephone first really talked and a complete and intelligible sentence was transmitted over the first telephone line between Alexander Graham Bell and Thomas A. Watson, Bell's assistant. Nowadays a conversation between persons half a world apart is infinitely clearer and easier than was that first message sent over a wire between two rooms in the same building when Doctor Bell exclaimed, "Mr. Watson, come here, I want you."

From that day onward the whole world has been saying to the telephone, "Come here, we want you." We have only to glance through the telephone's brief history, from the day of the first message to today when it is possible for a person to be heard all the way around the world in one-third of a second, to be convinced that the progress of the telephone industry constitutes one of the most remarkable growths in the history of American business.

The lightning rod was invented in 1752, the steamboat in 1793, the telegraph in 1835 and the electric locomotive in 1851. We do not think of any of these inventions as particularly old, yet the steamboat had been in use 83 years before Bell and Watson had their first conversation over the telephone. Seventy years ago who would have thought it would be possible someday to carry the human voice over a wire by means of electric current? Yet today there are about 27,500,000 telephones in the United States alone, or approximately one for every five persons. It is extremely doubtful if any single factor in the world's history can offer such an astoundingly rapid development as the telephone.

Others Tried Before Bell

The term telephone was used first by John Phillip Reis of Friedrichsdorf, Germany, in 1861. Prior to that time certain persons had been successful in transmitting sound by electric current, but not the human voice. Notable among these were Professor Page in Salem, Mass., in 1837; Dr. Joble of Geneva, Switzerland, in 1843; Edward Farrar of Keene, N. H., in 1851, and Charles Bourseul, a French soldier in Africa, in 1854.

Professor Reis's apparatus, which caused some discussion as to whom credit rightfully belonged for the discovery of the telephone, was entirely different from Bell's instrument. Furthermore, as the records show, Reis was never able wholly to succeed in transmitting the human voice. Indeed, in one of his lectures he is reported to have said:

"Hitherto it has not been possible to reproduce human speech with sufficient distinctness. The consonants are for the most part reproduced pretty distinctly, but not the vowels as yet to an equal degree."

Bell Recognized as Telephone Inventor

The world pretty generally admits that Dr. Alexander Graham Bell, a native of Edinburgh and later a resident of Boston, was the man to whom we owe the great success of the telephone. Not only did Doctor Bell actually discover the principle on which the telephone is based, and succeed in transmitting vowels and consonants with equal clarity, but he made possible the commercialization of the invention on the scale to which it has since been developed. Probably Professor Reis would have doubted the possibility of sending the human voice from New York to San Francisco in one-fifteenth of a second, as is now done.

It is perhaps bromidic to say that Bell was a poor man. Most inventors are. Carrying on his Boston experiments, a work of many months, necessitated great hardship and sacrifice. It is written that he owed a small bill for

On March 10, 1876, at 5 Exeter Place, Boston, Dr. Bell transmitted to Mr. Watson the first telephone message—"Mr. Watson, come here, I want you."

hardware and that the store owner declined to extend any more credit, believing that the experiments were foolish. Another man refused $200 worth of stock in the Bell company in payment of a bill of $150. This incident occurred after the telephone had been proved to be a success. Even those persons who were willing to acknowledge that perhaps Doctor Bell might be able to transmit the voice by wire were unconvinced as to what use could be made of the fact. But the inventor thought otherwise.

An Important Telephone Year

In 1875, he managed to perfect what he called his "Harmonic Telegraph," by which he hoped to send several telegraph messages simultaneously over the same wire. It was while experimenting with this apparatus that he achieved his dream of years—how to make a machine that would transmit the human voice. This was on June 2, 1875, and before another year had passed he had been able to transmit his famous message to Mr. Watson. On November 26, 1876, he carried on the first long distance conversation between Boston and Salem, Mass.

The year 1876 is important in the history of the telephone. It was in June of that year that Bell exhibited the invention at the Centennial Exposition in Philadelphia. One might think that the judges would be fascinated by the strange machine, but they were not. It was relegated to the background and hardly noticed. It is a fact, of which we should not be proud, that a foreigner, Dom Pedro, Emperor of Brazil, first gave it any attention. The Emperor knew and admired Doctor Bell as a teacher of speech to deaf mutes. He agreed to listen in the receiver while the inventor spoke from another room. "My God!" cried the Emperor, "It talks." And from that time the success of the telephone was assured, though there were still many difficulties to be overcome. In fact, when Doctor Bell took the invention to Boston to look for capital to finance it, people shook their heads, wished him luck, but declared it was too hazardous an enterprise in which to invest their money.

New York Talks to Boston

However, by 1880 there were 30,872 Bell telephones in the country and conversation had been heard for as great a distance as the 45 miles between Boston and Providence. A year later, cable was placed underground and the voice was heard for a quarter of a mile. In 1884 New Yorkers first were able to talk to Boston, and eight years later it was possible for a person in Manhattan to speak to Chicago.

By 1900, the year before the Pan-American Exposition, there were 676,733 telephones in the United States and two years later the first long distance underground telephone conversation was heard. This long distance, it might be added, was the 10 miles separating New York from Newark.

In 1911 New York could talk to Denver, in 1913 to Salt Lake City. On January 25, 1915, Doctor Bell, speaking in New York, addressed Mr. Watson, this time in San Francisco, and again said, "Mr. Watson, come here, I want you," as he had said 39 years before in the little room in Boston.

Six years later a conversation was recorded between Havana, Cuba, and Catalina Island, Calif., which was sent by submarine cable, overhead and underground wires and radio-telephone combined, a distance of 5,500 miles. In 1922 came the first ship-to-shore conversation.

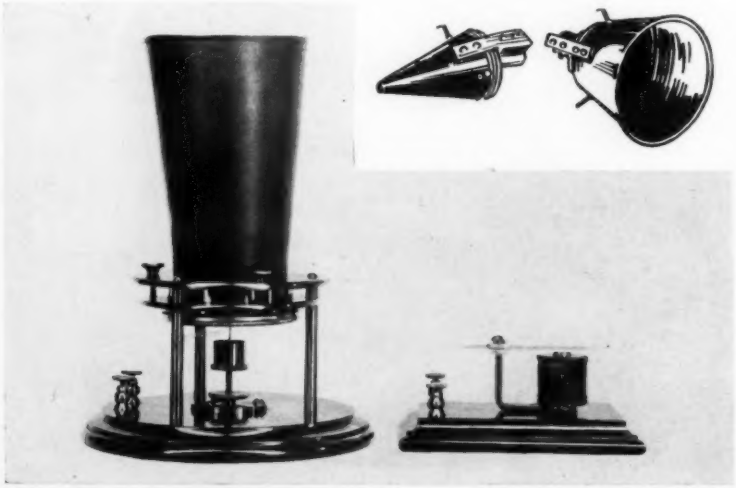
The little instrument which spoke its first words in 1876 has had quite a history and on this 70th anniversary of the first telephone message the United States has more than 50 per cent of all the telephones in the world. There were special reasons for the speedy development of the telephone in the United States and the story of that development deals with the work of two groups, in no way financially related—the Bell System and the Independent telephone industry.

Competition of the Early Days

Development of the telephone industry sprang from the basic patents granted to Alexander Graham Bell in 1876 and 1877 and it was natural that early development be confined chiefly to the large centers of population where the telephone was more appreciated. By the time the basic patents had expired in 1894, there were about 270,000 telephones in service in the United States.

Looking back over the years, one notes the indelible mark competition has made upon telephone communications in the United States. History tells us that only a few hours separated the filing of two fundamental telephone patents—and the courts finally ruled that Bell's application was filed before that of Elisha Gray's. Throughout the period of Bell patent monopoly, there was continued competition of patents.

The Western Union Telegraph Co. seriously threatened Bell's existence with telephone patents of Gray and Edison. Competition between Gould and Vanderbilt interests for control of Western Union is said to have been responsible for settlement of the Bell



Bell's liquid transmitter and tuned reed receiver of March 10, 1876. (Insert) Telephone patented by Dr. Bell in 1876.

As Prof. Alexander Graham Bell looked when the telephone was born.

patent suit against Western Union, resulting in Western Union withdrawing from the telephone field.

During the remainder of the life of the fundamental telephone patents, the Bell company bought hundreds of other patents. The one fundamental patent not acquired, because it was then considered unimportant, was that covering the automatic telephone. For that mistake in judging future progress, the Bell company in later years expended thousands of dollars for patents, payment of royalties and for costs of experiments.

Following the expiration of the Bell fundamental patents in 1893 and 1894, the Independent operating companies entered the field, but it took some time to design, develop and produce telephones which did not infringe on the many patents acquired by the Bell during the period of its patent monopoly.

Independents Enter the Field

The successful conclusion of the fight upon the Berliner patent cleared the way for Independent manufacturers to produce equipment for meeting the rapidly increasing demands of newly organized Independent operating companies. The Edison and other patents having previously been declared invalid by the courts, the Independent manufacturers had an open field for producing the three essentials of a good telephone — receiver, transmitter and automatic switch hook.

The entry of the Independents into the field not only strengthened the ambitions of Bell to maintain a monopoly of the telephone industry; Bell also was stimulated to extend its service into cities and communities which it had made no effort to serve, although previously its operations were confined entirely to the larger cities.

Competitive exchanges were installed in many cities. In many instances Bell and Independent plants were constructed simultaneously and there was a race to be the first to establish service. Veteran telephone men, who saw the industry grow out of its swaddling clothes, can well remember that there was competition in nearly every community and sometimes four or five different companies operated in the same territory. Each one had its staunch supporters and subscribers. Local merchants had their problems, too, since many of them felt obliged to have a telephone of each company so they could serve all the trade.

Service was offered by the Independent companies at rates substantially lower than those of Bell. In retaliation, the Bell frequently reduced its charges to a point below those of the Independents, in some instances giving free services or offering premiums as inducements for telephone installation orders.

The public became telephone conscious and, during the first two decades after the entrance of the Independents into the field, the telephone industry of this country developed at a tremendous pace. The 300,000-odd telephones in service in 1894, when the Independents entered the field, grew to 6,483,600 by 1908.

At about the end of the year 1915, Bell had approximately 5,300 exchanges and the Independents had 16,000. Bell and Independent exchanges were in competition in about 1,000 places and in about 600 places the Independent companies were competing with each other. With development of practical long distance telephony and the Bell owning the major part of the toll lines, the public and the Independent companies made demands for more complete interconnection between the companies without regard to ownership.

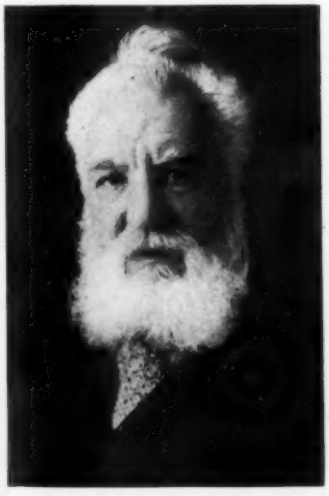
A general understanding brought about by discussion between the Bell and Independents at the suggestion of governmental agencies has led to the present status of the telephone industry. In some cases, Bell companies purchased competing Independent companies and in other instances the Independent companies purchased competing Bell exchanges.

Thus, dual telephone service in many places was eliminated. Competition ended largely with the Kingsbury committment on December 19, 1913, which pledged an abandonment of Bell efforts to acquire Independent properties. Since that time Bell has concentrated its efforts upon improving service, equipment and its public relations and there is no competition in the telephone operating field.

Independents Firmly Entrenched

Today one of the biggest little businesses and one of the best entrenched is the Independent telephone industry. It is little because the great majority of the telephone companies outside of the Bell System are rural exchanges with a hundred or so subscribers. It is big because fully two-thirds of the area of the United States is dependent upon some 6,500 Independent companies and the approximately 60,000 Independently operated rural lines for service. The Independents at the end of 1945 operated approximately 5,400,000 telephones in the United States and served more subscribers than the total for Greater Germany and almost as many as Great Britain and France combined.

It is entrenched, because the Independent telephone man, however small the company, is free of competition. In most cases, he has a franchise giving



Prof. Bell lived to send his voice across the continent by telephone in 1915.

Thomas A. Watson was a young man when he heard first telephone message.

Mr. Watson as he appeared in 1915 when transcontinental line was opened.

him undisputed possession of the telephone business of his community. He frequently has a business which a large nationwide system could not possibly operate on a profitable basis.

About one out of five of the approximate 28 million telephones in the United States is owned by Independent telephone companies. Towns and cities under 50,000 population are their stronghold, although they also operate in some large cities.

The Independents own around 5,400,000 telephones; they have 10,000,000 miles of wire and handle in the neighborhood of 19,000,000 local and toll conversations every day.

The 6,500 odd Independent companies are scattered over the entire country, having exchanges in every state except Delaware. Although the greater number of Independent operating companies are small in size, approximately 152 Independent companies have gross incomes in excess of $100,000 per year and about 81 have gross incomes of $50,000 to $100,000 per year at December 31, 1943.

Through full exchange of long distance telephone facilities between the large and small companies, the American telephone business can be hooked up into a system serving 19,000 communities, approximately 12,000 of which are served by Independents and 7,000 by the Bell System.

The high standard of telephone service in the United States reflects a high degree of cooperation between Bell and Independent companies. Without such cooperation telephones could not be so quickly and readily connected one with another, for obviously there is a most complex operating problem involved in so combining the facilities of thousands of companies that anyone, anywhere, can pick up a telephone and talk to anyone else, anywhere else.

The old competition between the Bell and Independents which often had competing switchboard operators engaging in hair-pulling contests and linemen and installers cutting "enemy" lines is no more and today Bell System and Independent companies work together harmoniously to provide this country with the best telephone service in the world.

Independent Manufacturers

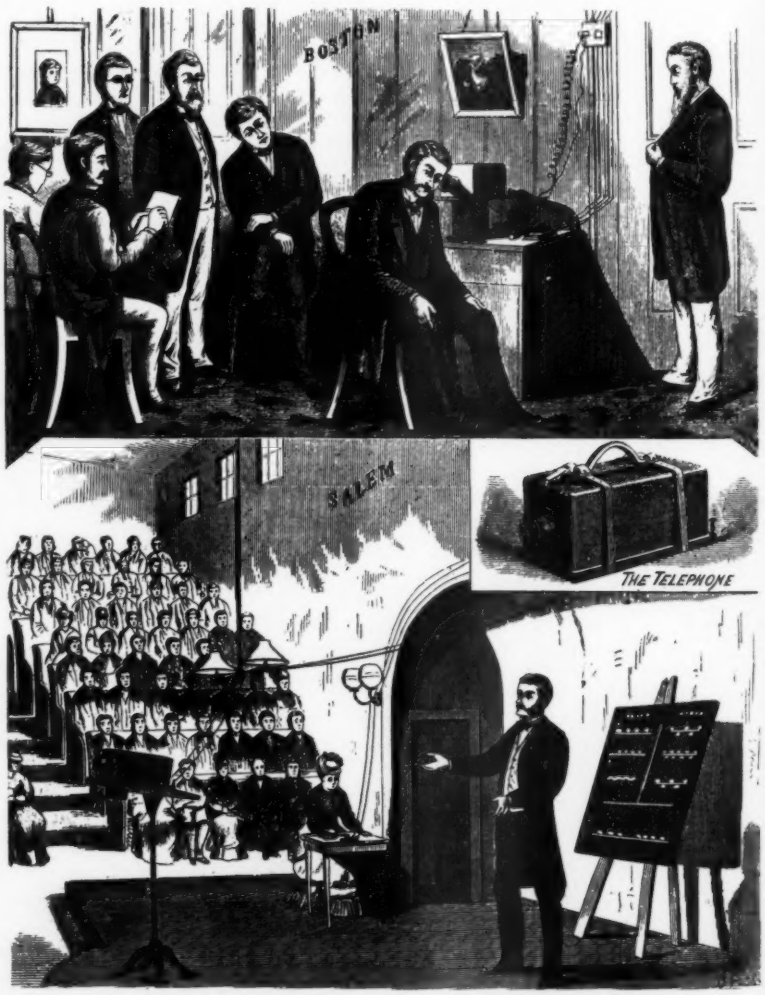
Independent manufacturing companies as well as the Western Electric Co., Bell manufacturing unit, have played an important role in the development of the telephone business. The Independent manufacturers carried the burden of developing and manufacturing telephones, switchboard equipment and apparatus for Independent operating companies which would not infringe upon early Bell patents, which would operate as efficiently as the Bell, and be provided at a cost that would enable Independent operating companies to function at economical rates. By 1905 Independent manufacturers had made available equipment with which Independent operating companies could maintain a real service in competition with Bell.

Independent manufacturers have originated many notable improvements in telephone equipment for use by Independent operating companies, a number of which were adopted years later by Bell operating companies. Independent telephony was responsible for a long list of technical developments, among which are: Harmonic automatic ringing; convertible switchboard system for providing either local or common battery service; groundless substation or two-wire system; four-party line indicating key; insulated desk and wall telephones; straightforward trunking; the step-by-step automatic system; pay-station coin collectors, protective equipment and many other inventions—all important to the progress and development of today's excellent telephone service.

Unattended automatic exchanges were introduced by Independent manufacturers in 1916. Although Bell provided a handset telephone in the very early years, no progress was made with the development until 1903 when Independent manufacturers placed handsets on the market. The combination bell-in-base handset was brought out in 1928, although one Independent manufacturer had produced one form of it as early as 1916.

Out of the local service in the large

(Please turn to page 37)



Dr. Alexander Graham Bell lecturing to an audience at Salem, Mass.—the inventor is illustrating his demonstration by means of a telephone placed before his audience and communicating with his laboratory at Boston, four miles distant.

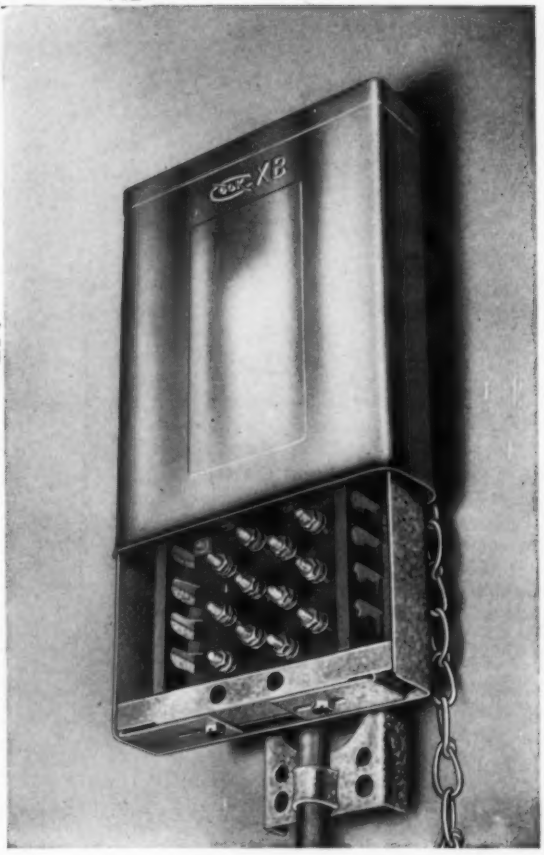
TYPE

XB

CABLE TERMINAL

by

Cook



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Wage-price increase policy adds to inflation spiral. . . . Telephone companies, particularly small ones, cannot continue operating under present low rates in face of rising costs. . . . Mr. Welch advises them to start working on rate increase applications now.

WHEN labor unions begin to worry about the country going into an inflationary spiral, it is a pretty sure sign that there is danger of just that sort of thing happening. Utility companies, caught as they are under a rigid ceiling of rate regulation, well may take notice of the storm warnings thus flying over the inflationary front.

Telephone rates, for example, have not increased since Pearl Harbor and on the whole have not increased within more than a decade. On the contrary, the general average rate level for telephone service undoubtedly declined somewhat, in view of the successive reduction in long distance rates and some local exchange rate cuts as well.

So, if labor costs and resulting material and labor costs are going to start rising steadily, it is obvious that the operating telephone industry cannot stand still, indefinitely holding the line, about which few others, including the administration, seem to be too much concerned. It is not too early for some of the smaller Independent operating companies to begin taking stock of rising operating costs and diminishing profits, if any. Carelessness or delay well might postpone relief until after a property has been seriously damaged, even to the point of impairing its ability to continue to serve the public.

This is not to suggest that telephone companies should go immediately to state public service commissions and file applications for rate increases. But it does mean that telephone companies should watch their operating cost figures more carefully than ever before. The financial position of a number of small companies during the present period of economic dislocation might be compared to an airplane flying in tricky weather over difficult terrain at a hazardous altitude. The various instruments and gauges must be consulted constantly so that the utility will be in a position to take prompt steps for relief in case of really serious trouble.

The inflation that may come to America as the result of our continued price and wage dislocation is not going to be anything like the wild and ruinous variety experienced in Germany after World War I. In that case, the economic situation had gotten so far out of control that the results were fantastic and incredible. In December, 1923, cost of living in German marks had shot up to 125 trillion times as much as they were 10 years previous. Our native variety of inflation, however, is more likely to be a sort of creeping variety. As a matter of fact, we already have had some inflation for several years without realizing it.

Cost of living in the United States last September was 85 per cent higher than in 1913 and 30 per cent above the 1940 level. Today the Office of Economic Stabilization estimates that our cost of living is roughly about one-third above the pre-Pearl Harbor level. Some labor unions say it is even more than that. It is for this reason that our labor unions have been insisting upon higher wages and our industries have been insisting on higher prices to take care of—partially at least—such payroll increases.

The federal administration is still trying to keep the lid buttoned down as much as possible, hoping that the restraining effect finally might settle the nation's economy, even though it means settling it on a higher wage-price-cost level (amounting to a permanent devaluation of the American dollar in terms of purchasing power). If the administration's fairly mild anti-inflationary program should fail, the result well may be another economic merry-go-round, with higher wages chasing higher prices around and around in a futile spiral, like a dog chasing his tail.

(Please turn to page 22)

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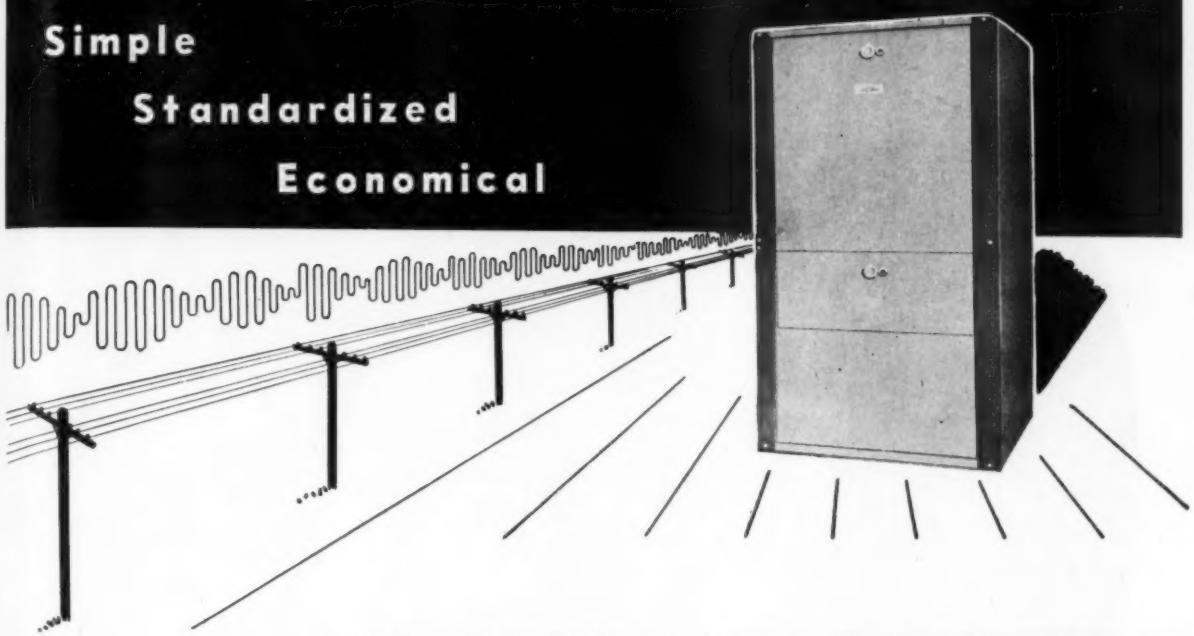

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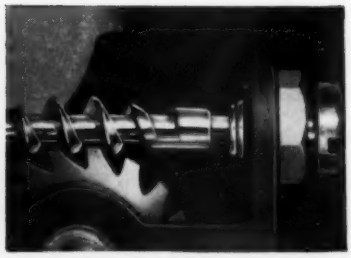
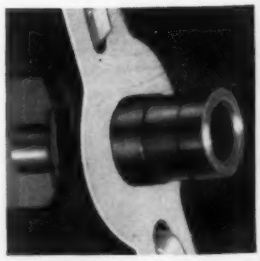


Governor worm is accurately cut—turns smoothly and quietly on ball thrust bearing.

Special laminated worm gear is self-lubricating, non-sticking, long-wearing.



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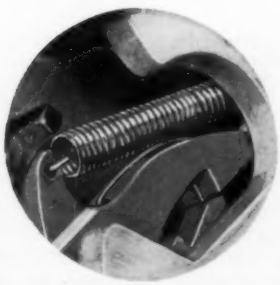
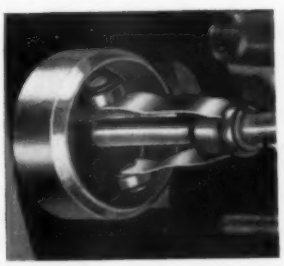
e pawl-lock prevents dial unning at end of its operation.



Patented "quieted" pawl makes this the world's quietest commercial dial.



Fiber inserts in governor provide positive speed control, with negligible wear.

Flanged finger-plate provides greater strength, minimizes "fly-wheel effect."

The obvious difficulty of regulated public utility companies, such as the operating telephone industry, is that it cannot hop on the merry-go-round and get its share of the ride. The procedure for obtaining rate increases by telephone and other utility companies is a pretty deliberate process, with a very doubtful outcome. Considering most state regulatory law, the average minimum of time in which a telephone company can have its rate increase, even without a single voice of opposition, would be about 90 days from the date of filing the application (or in some states filing the so-called "tariffs"). An additional 30 to 60 days might be required to prepare the necessary data to support and justify the increase in the event that opposition does materialize. Most state laws have theoretical "emergency clauses." But state commissions rarely invoke emergency clauses for the purpose of giving peremptory relief, except in a few isolated cases during and following World War I. Then, of course, there is OPA, which requires notice and opportunity to intervene. OPA's record of intervenvention has been such that opposition to any material rate increase is almost to be expected as a matter of course.

And so, to repeat the warning, now is not too soon for telephone companies, particularly smaller companies whose cost and operating figures may not be put under close control, to start watching their economic gauges more often and more carefully. Payroll cost, material cost and tax figures for the year 1946 should be projected against current revenues and required return; and if the answer begins to look like red ink, even though the anticipated deficit is some months away, it is not too soon to start working on those applications for increased rates.

The recent annual report of the American Telephone & Telegraph Co. shows that the great Bell System, with all its financial resources, is doing more business and making less money at it than before the war. Specifically, during the four years beginning 1942, earnings on invested capital averaged only 5.5 per cent—the lowest in the history of the Bell System, except during the worst years of the depression in the early 1930's. With the volume of business and operating revenues at record levels in 1945, earnings on the total capital invested in the business were still only 5.5 per cent.

These figures do not, of course, take into consideration increased operating expenses which are bound to result from the settlement of current widespread increased wage demands of the affiliated unions of the National Federation of Telephone Workers. True, there will be some offsetting benefit in 1946 as the result of the removal of excess profits taxes. But it must be remembered that the elimination of the excess profits tax, steep as it was in terms of percentage levy, will not cause any corresponding decrease in the Bell System total federal tax bill. Taxable income is still subject to the normal income tax, which means that the saving (resulting from the elimination of excess profits taxes) will amount to only a little more than half the excess profits tax previously paid.

Telephone companies, generally, are going to require substantial amounts of new capital to finance proposed construction programs and rehabilitation programs. *The Independent telephone industry will not be able to finance its share of such programs unless its anticipated revenue and earnings are in such shape as to attract new capital or warrant the risk of funded debt investment.*

* * *

The revelation that the AFL unions are blaming the CIO unions for forcing a break in the price line was found in a recent article in the AFL monthly publication, *Survey*. The *Survey* article, which did not mention the CIO by name, but made no effort otherwise to disguise its target (in addition to reference to "Communists," etc.) stated in part:

"None of our (AFL) gains caused any increase in prices. Even during the peak strike period (January 15 to February 16) we kept right on peacefully negotiating agreements for substantial wage increases. To date we have won wage increases averaging from 10 to 20 cents an hour and up for about 3,000,000 workers. Early in February, when a total of 1,400,000 workers were on strike, only 60,000 of those strikers were AFL members.

"Unions outside the federation, however, had other methods. Simultaneous strikes in basic industries, with uncompromising demands, were designed to force government intervention with fact-finding boards and wage formulas. To meet their demands the President broke the steel-price ceiling, then issued his drastic wage-price order of February 14 to deal with the consequences of this price break.

"So the government again intervenes between workers and management, collective bargaining is again frozen and all workers are put under rigid wage controls. All workers will be robbed of part of their wage gains, for the broken price line will 'bulge' upward and living costs will rise."

AFL increases, the article said, "were all clear gain, because employers and workers had considered the facts and agreed on increases which would not break price ceilings.

"Many of our increases were well above government formulas set in other industries; in some cases, where employers could not pay more, we accepted five cents now and 10 cents later, or left the wage clause open for further increase when production was restored," it added.

"Under the 'other method'," said the article, "the government is brought between management and labor to dictate a wage formula. A substantial increase is awarded, the price ceiling is broken. Workers' living costs go up. It is estimated that the rise in living costs this year will be from eight to 10 cents on the dollar. So workers pay back part of their wage increase.

"Most American workers are too intelligent to let themselves be fooled," it was said. "They know that wage increases have to be paid out of the earnings of the business, or else by a price increase. Tactics which force government intervention and raise living costs bring a loss in the long run. Collective bargaining is the sure way forward. The President would have done American workers a greater service if he had stood by his August 18 wage policy."

The AFL attack on CIO policies was contained in the following passage from the *Survey* article. Claiming that the President's August 18 wage-price policy did not break down in AFL unions, the *Survey* article stated:

"However, other unions did not want to take the responsibility that goes with freedom. They wanted government intervention. The AFL has for years kept Communists out of policy-making positions. The new wage-price policy is a backward step, a return to government dictation of wage rates, a body blow at free collective bargaining.

"American workers have just had a severe lesson in the meaning of government controls. The new wage-price order robs us of our freedom and freezes collective bargaining in much the same way as the wartime Little Steel formula. But because there are Communist agents among us who are maneuvering to bring about more and more government control, it is important for union members to know what government domination of industry would actually do to their living standards."

* * *

Speaking of labor problems, the Communications Act (under which interstate telephone, as well as radio broadcasting operations are regulated by the FCC) is likely to get a new amendment by act of Congress. Thanks to James C. (for Caesar) Petrillo, the members of Congress are so het up over the czar-like attitude of the head of the musicians' union that the House of Representatives passed a law to put

Mr. Petrillo back in line by the thumping big vote of 222 to 43. The Senate this week was due to take up the bill, and the chances for passage were regarded as favorable, although the Senate will not move so quickly as the House. There was a chance that the bill could go directly to conference.

The new Petrillo bill could hardly affect telephone company operations in any way. But it would establish a pattern that eventually may spill over into legislation affecting other labor union activities. The reason why this so-called "Petrillo Bill" had to come up as an amendment to the Communications Act, rather than an original statute, was because sponsors of the bill saw no other way of by-passing the strongly pro-union House Labor Committee. If the bill had gone to the House Labor Committee, headed by Representative Norton (D., N. J.), it would have died in a pigeonhole like any other bill designed to regulate labor.

But as an amendment to the Communications Act, the Petrillo Bill went to the House Interstate & Foreign Commerce Committee, which handles all legislation dealing with the FCC. Indeed, the author of the bill is none other than Representative Lea (D., Calif.), chairman of the House Interstate & Foreign Commerce Committee.

The Lea Bill (HR5117) would make it unlawful for any union to apply the following "coercive practices" with respect to radio broadcasting. Specifically it would make unlawful:

(1) To require broadcasters to employ any person, or number of persons, in excess of the number actually needed.

(2) To compel radio broadcasters to pay or give compensation in connection with the services of such excess persons.

(3) To compel a broadcaster to pay more than once for services performed.

(4) To compel broadcasters to pay any amount for services not performed.

(5) To interfere with the broadcasting of non-commercial educational or cultural performance where the actual performers receive no compensation above expenses.

(6) To interfere with the broadcasting of any program originating outside the United States.

The bill also would make it unlawful for any union to require the payment for broadcasters of any tribute for the privilege of making or using recordings or other mechanical reproductions. Any attempt to interfere with the manufacture or distribution of such mechanical devices, or to restrict their use, likewise would be condemned.

Mr. Petrillo's difficulties with Congress grow out of his attempt to restrict the nation's economic activity (in connection with musical entertainment) at will, on behalf of his union's objectives. As a matter of fact, the U. S. Supreme Court used Mr. Petrillo's tactics as an argument to justify its decision which immunized comparable tactics of the teamsters' union from the federal law which forbids racketeering for ordinary people.

It is just this immunizing of the unions against criminal and civil laws that apply to other groups and individuals which is the vice of the post-1933 labor policies as they built on and continued errors preceding 1933. By biased legislation, by strained Supreme Court decisions and by simple subversion of unrepealed statutes and ordinances, the unions and their members have been given a position of special privilege outside and above the law. While the unions are no worse than the rest of us, they are no better. The result of this systematic immunization from the laws that the experience of thousands of years has shown to be necessary to keep the rest of us in order, is union abuses like Petrillism.

It would seem, however, that the cure for those abuses is clearly to put the unions back under the general law. It is not to pile on top of special privilege a whole tangle of restrictions of the special privilege. The principle of the general law may indeed have to be applied specially by special statutes in industries where special conditions prevail. But if it is right to outlaw extortion and featherbedding — and it *is* right—in radio, those practices should be outlawed, too, in other lines of business. It is good to give to the radio business protections against Petrillism. But concert halls, theaters and other employers of musicians have a right to the same protection and do not get it in this bill. The over-all cure of labor abuses is not to grant Mr. Petrillo special privilege and then try to tell him how to exercise the special privilege. The cure is to repeal the special privilege and, at one orderly sweep, cut Petrillo, Lewis, *et al.*, back to that simple equality before the law, which is all the rest of us would think of asking, and which is the life principle of our kind of society.

»» The first mention of transmission of a sound through distance has been traced to a manuscript of Robert Hooke, an English physicist, dated 1667. The manuscript says: "Now it became possible to transmit a sound to a great distance, and I think that it is possible to make another experiment, increasing the distance 10 times."

Hooke goes on to say that with a stretched wire he transmitted sounds to so great a distance and with such speed that, although less than the speed of light, it certainly was much faster than the speed of a sound in the air. He mentioned that he not only transmitted sounds through a direct, straight line but he had several bends also.

»» In the laws and principles of telephony many of the names of discoverers have been applied to discoveries. As a result, Ohm's law, Joule's law, the watt, the amperes, the volt, etc., have taken names which connect them directly with their discoverers.

The volt and its derivatives originated from the discoveries of Volta; the ampere from a distinguished French scientist, Andre M. Ampere, and galvanism from Luigi Galvani, a celebrated physicist of Bologna.

»» At one time Professor Bell took the first working model of his instrument to a lawyer named John A. Logan and offered him a half interest, saying it would do away with the telegraph and there would be millions of dollars in it. Logan replied, "I dare say your machine works perfectly, but who would want to talk through such a thing as that, anyway? I advise you to save your money, young man."

Bell then offered a tenth interest to an examiner in the patent office for $100 in cash. The offer was refused. That tenth interest was worth $1,600,000 in 15 years—but the examiner was still examing patents.

Rural Line Service

By John D. Taylor CONSULTING ENGINEER

IN COMMERCIAL telephone systems, conservation of space and other practical construction considerations necessitate grouping of the various circuits in close association with each other in accordance with the circuit design patterns of the particular office and outside distribution plan. Thus, in offices, groups of circuits are enclosed in textile, or lead-covered cables, and in wire forms, while in the outside plant, many wires are formed in lead-covered cables, insulated wire runs, or suspended with only a few inches separation on open wire pole lines.

This close association of the wires which form parts of conversation carrying circuits, together with their electrical characteristics, introduces the problem of crosstalk. Crosstalk is simply electrical speech energy induced or transferred from one telephone circuit into one or more adjacent circuits. Crosstalk not only affects the intelligibility of conversations on the adjacent circuits, but may cause a serious doubt in the minds of the subscribers as to the secrecy of the service. It is, therefore, necessary that crosstalk be properly controlled.

PART V. Crosstalk. The fourth article in this series appeared in the February 23 issue, page 13.

Theory of Crosstalk

When two telephone circuits closely parallel each other and one is transmitting electrical speech currents, the other circuit is affected by the magnetic fields set up by the speech currents. The effects of these fields depend largely on (1) length of parallel; (2) magnitude of the induced currents and voltages; (3) separation between the transmitting (disturbing) and disturbed circuits, and (4) frequency range of the transmitted current.

In *Fig. 1*, magnetic lines of force set up by speech currents flowing in Wires 1 and 2 (Circuit A), cut Wires 3 and 4 (Circuit B), inducing in Circuit B small voltages (e_1 and e_2) which vary in accordance with the speech currents in Circuit A. Voltage e_1 induced in Wire 3, is larger than e_2 in Wire 4, since Wire 3 is closer to Circuit A than Wire 4. The resultant voltage in Circuit B (e_1-e_2) causes the resultant current i_m to flow in Circuit B.

In *Fig. 2*, electric charges set up by speech currents flowing in Circuit A are impressed upon Wires 3 and 4 (Circuit B) through the capacity couplings shown. Since Wires 3 and 4 are not the same distance from Wires 1 and 2, these couplings and, consequently, the impressed charges or voltages, at a given instant, are different. Thus, between Wires 3 and 4, a small resultant voltage e_3 is developed which varies in accordance with the speech currents in Circuit A. This voltage causes current is to flow in Circuit B.

In *Fig. 3*, the induced currents i_m and i_e, due to magnetic and electric induction, respectively, are shown in Circuit B. The net result is that a small residual current from the two types of induction flows in Circuit B. This current follows the variations of the speech current in Circuit A, and, in this manner, if of sufficient strength, produces intelligible sounds in the listener's receiver and is recognized as crosstalk. However, not all crosstalk is intelligible even though the induced currents are of sufficient strength. This is true of some crosstalk between carrier channels and in cases where other foreign induced currents affect the crosstalk currents materially.

Plant Affected by Crosstalk

(1) Cable. If exchange distribution cables are free from trouble, such as leakage or low insulation, grounds, shorts or opens and circuits are operated metallically through them, there should be no crosstalk of consequence develop in the cables.

The older non-staggered twist cables inherently have a higher average crosstalk coupling between pairs than the later type staggered twist cables. The

(Please turn to page 29)

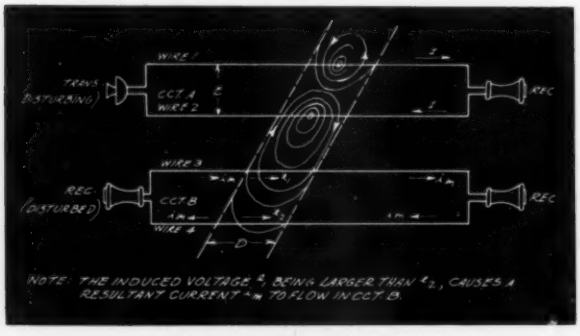


Fig. 1. Magnetic induction.

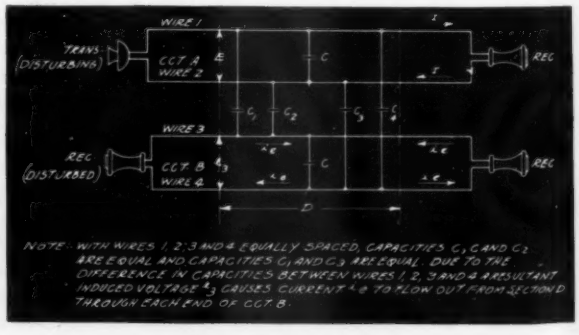

WIRE 1
TRANS. (DISTURBING)
CCT. A
WIRE 2
REC
WIRE 3
REC (DISTURBED)
CCT. B
WIRE 4
REC
D
NOTE: WITH WIRES 1, 2, 3 AND 4 EQUALLY SPACED, CAPACITIES C_1 AND C_2 ARE EQUAL AND CAPACITIES C_3 AND C_4 ARE EQUAL. DUE TO THE DIFFERENCE IN CAPACITIES BETWEEN WIRES 1, 2, 3 AND 4 A RESULTANT INDUCED VOLTAGE e_3 CAUSES CURRENT i_e TO FLOW OUT FROM SECTION THROUGH EACH END OF CCT. B.

Fig. 2. Electric induction.

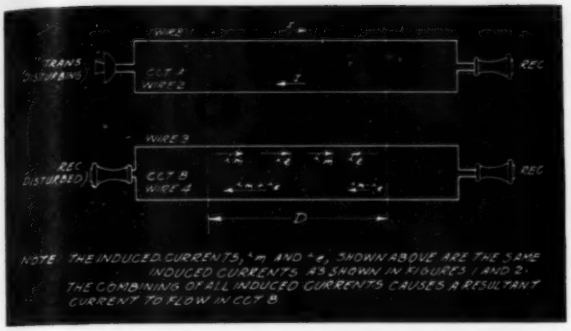

TRANS. DISTURBING
CCT. A WIRE 2
REC
WIRE 3
REC DISTURBED
CCT. B WIRE 4
D
NOTE THE INDUCED CURRENTS, I_m AND I_e, SHOWN ABOVE ARE THE SAME INDUCED CURRENTS AS SHOWN IN FIGURES 1 AND 2. THE COMBINING OF ALL INDUCED CURRENTS CAUSES A RESULTANT CURRENT TO FLOW IN CCT B.

Fig. 3. Resultant induced currents from magnetic and electric induction.

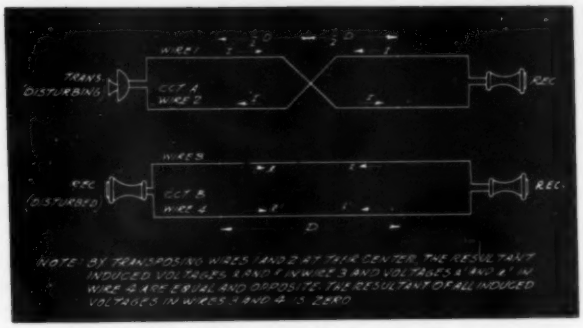

WIRE 1
TRANS. DISTURBING
CCT. A WIRE 2
REC
WIRE 3
REC (DISTURBED)
CCT. B WIRE 4
D
NOTE: BY TRANSPOSING WIRES 1 AND 2 AT THEIR CENTER THE RESULTANT INDUCED VOLTAGES E_3 AND E_1 IN WIRE 3 AND VOLTAGES E_4 AND E_2 IN WIRE 4 ARE EQUAL AND OPPOSITE. THE RESULTANT OF ALL INDUCED VOLTAGES IN WIRES 3 AND 4 IS ZERO

Fig. 4. Resultant induced voltages from magnetic and electric induction.

first mentioned type, however, when in good condition, should not add appreciably to the over-all crosstalk.

(2) Open Wire. Open wire pole lines, on which the line wires usually are spaced about 12 ins. apart or sometimes less for non-pole pairs and about 16 ins. apart for pole pairs, are, in general, the greatest source of crosstalk between circuits. Since rural lines in the rural sections are principally of open wire construction, further discussion of crosstalk will be confined to this type of rural plant.

(3) Underground (buried) Wire. Underground wire of the type under discussion here is composed of two parallel conductors insulated with rubber, or other material, and enclosed in a braided covering. Where two or more such pairs are installed together in a common trench, it is essential to introduce twist in the pairs during installation and reverse the tracer wire at splices between reel lengths. Wire installed in this manner should not contribute materially to circuit crosstalk.

Crosstalk Standards

(1) Crosstalk Units. In order to understand the basis for establishment of values of crosstalk, which can be tolerated under the accepted standards of transmission, it also is necessary to know something about crosstalk units and couplings.

Crosstalk may be measured in terms of crosstalk loss or crosstalk units between disturbing and disturbed circuits. When measured as a loss, it simply means that if there is speech power (P_1) at any instant at a given point on a circuit and the measured speech power at the same instant at some point on a second paralleling circuit, due to the electrical coupling between them is P_2, the crosstalk coupling or loss in decibels between the two points on their respective circuits is given by the formula, $10 \text{ Log}_{10} \frac{P_1}{P_2}$

This is also the formula used in determining transmission loss. Thus, crosstalk loss, like transmission loss, is based on a power ratio and not on absolute powers.

When crosstalk is expressed in terms of crosstalk units, one million units are equivalent to zero decibels crosstalk loss; 1,000 units to 60 decibels loss; and one unit to 120 decibels loss. The relation between crosstalk loss in decibels and crosstalk units is given by the formula, crosstalk

$$(\text{DB}) = 20 \text{ Log}_{10} \frac{10^6}{\text{Crosstalk Units (Cu)}}.$$

(2) Standards. In arriving at suitable standards for message telephone circuits, opinions were secured from a large number of observers listening to various values of crosstalk coupling under controlled talker volumes, receiving efficiencies and room and circuit noise. These data indicated the per cent of observers noting intelligible crosstalk for various values of crosstalk coupling between the disturbing and disturbed circuits with specified values of noise in the disturbed circuit

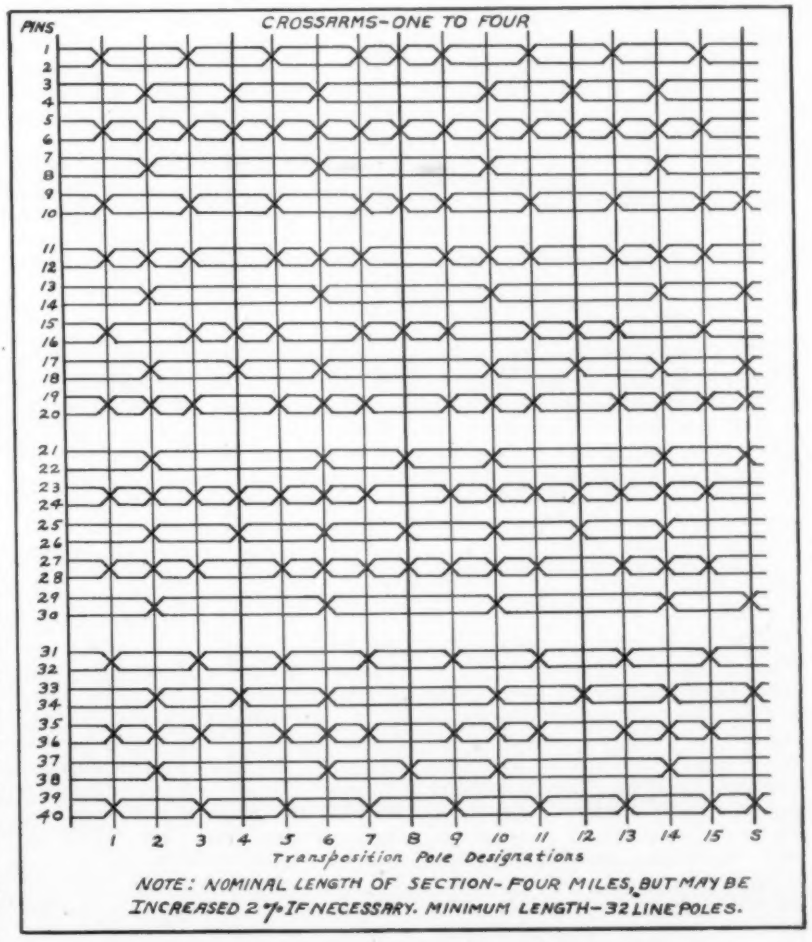

CROSSARMS-ONE TO FOUR
PINS
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 S
Transposition Pole Designations
NOTE: NOMINAL LENGTH OF SECTION-FOUR MILES, BUT MAY BE INCREASED 2% IF NECESSARY. MINIMUM LENGTH-32 LINE POLES.

Fig. 5. Transposition arrangements for exchange (including rural) circuits.

receiver, assuming certain average values of talker volume and receiving efficiency. Intelligible crosstalk in this case is defined as the overhearing and identifying of four consecutive words or the meaning of the conversation within about a seven-second interval.

Thus, on an empirical basis, it was determined some years ago that for residential subscriber loops (including rural), the value of average crosstalk coupling corresponding to a 1 per cent chance of overhearing intelligible crosstalk, is about 70 decibels (300 units of crosstalk). This calculation is based on the use of anti-sidetone handsets and staggered twist cable. This value of permissible crosstalk may or may not apply in any particular case and should not be taken too literally. In fact, permissible values of crosstalk in the different classes of plant will change from time to time with changes in telephone equipment and facilities and in service standards.

Remedial Measures

(1) Transpositions. With reference to open wire rural metallic circuits, the most obvious measure for suppression of crosstalk is the application of transpositions. *Fig. 4* shows how transpositions effect a neutralization of crosstalk. Resultant induced voltages (e and e) in Wire 3 are equal and opposite and likewise voltages e^1 and e^1 in Wire 4 are equal and opposite in the unit section D. The result is zero net voltage in Wire 3 and in Wire 4 and no induced current flows in Circuit B.

Due to numerous variations between wires and between wires and ground in appreciable sections of line, more than one transposition is necessary to maintain an adequate balance between two circuits.

Thus, where open wire circuits are closely associated on the same pole line for one or more miles, they should be transposed in accordance with some standard scheme.

One of the simplest layouts for non-phantomed exchange or rural circuits is shown for four arms (10 pin) in *Fig. 5.* The nominal length of this section is four miles with a maximum permissible increase in length of 2 per cent. Since there are 16 transposition poles in the full section, the minimum length will be 32 line poles. Portions of the full length section may be used in mile units for very short lines. The nominal transposition interval is one-quarter mile. With this scheme, circuits may branch off of the main lead at section line roads and still maintain a reasonably high crosstalk loss with other circuits on the lead. Transposition arrangements for phantomed exchange circuits are available if required. As many sections as needed may be used in tandem. Where power line exposures are present along the telephone line, other types of transposition schemes probably will be necessary to satisfactorily reduce power induction.

(2) Unbalances. Unbalances affecting telephone circuits are a common cause of excessive crosstalk. If transpositions are to be effective, the circuits must be well balanced electrically. For example, foreign grounds on a circuit, such as operated protector blocks, trees or wire contacts with grounded objects, low insulation or high resistance wire joints will prevent complete neutralization of crosstalk and usually will increase the crosstalk and noise level in the circuit. Improper or omitted transpositions in a circuit will have the effect of unbalancing the circuit electrically, particularly with respect to adjacent circuits. Grounded open wire circuits cannot be transposed for obvious reasons and should be avoided generally in new work and eliminated where they now exist, whenever practicable.

(3) Measurements. Simple, easily operated crosstalk measuring sets are available commercially and may be used to good advantage, where specific values of crosstalk are desired.

In the absence of such measuring sets, talking and listening tests and segregation of the affected circuits by sections often will be sufficient to locate and remedy crosstalk unbalances.

Service Improvement

Since good crosstalk conditions depend upon a well designed and maintained plant, the crosstalk problem is a continuous one in order to make certain that the original design of the plant is correct; that the plant is well maintained, and that changes in layout do not impair the circuit balances. Except for grounded circuits, most cases of crosstalk can be remedied with relatively small expense.

(To Be Continued)

USITA Committee Studies Contract for Small Dial Offices

The Dial Interexchange Committee of the United States Independent Telephone Association held conferences in New York City on February 5 and 6 for furthering the development of a "guide" contract which may be used in those instances where a company converts an exchange of 500 stations or less from manual to dial operation and calls upon a nearby company to perform for it certain exchange services.

The guide contract will cover traffic services which cannot practicably be rendered in the small community exchange after the operators have been displaced. These include such exchange services as information, assistance, emergency calls, "busy" and "no answer" verification, intercepting, service complaints, trouble reports and central office equipment alarm calls. Also, the guide contract will cover the use of switchboard and, if necessary, toll line facilities of the company assisting the one making the conversion.

The committee believes that the availability of a uniform and equitable procedure covering control office work performed one company for another will be of particular value in the period lying immediately ahead during which conversions will be made at an unprecedented rate. It is expected that the proposed contract will be ready for release within the next two or three months.

Committee members attending the February 5 and 6 conferences were: H. A. Burroughs, Chicago, Ill.; C. E. Jones, Erie, Pa.; D. A. Kafka, Tampa, Fla.; W. A. Kern, vice chairman, Rochester, N. Y.; R. A. Lumpkin, Mattoon, Ill.; F. E. Norris, chairman, Santa Monica, Calif., and George B. Quatman, Lima, Ohio. V. E. Chaney, Chicago, and H. W. Pike, Madison, Wis., were unable to be present. Mr. Chaney arranged for Rupert Shotts, Chicago, to serve as his alternate.

Radio-Telephone to Berlin

With the reopening of radio-telephone service with Berlin February 21, the program to connect the United States by telephone with eight German cities in the American Zone of Occupation has been completed, according to the American Telephone & Telegraph Co. Service with Frankfort and Munich was opened on January 10, and since then Heidelberg, Nuremberg, Bremen, Kassel and Stuttgart also have been linked to the United States.

V V

Frank Switzer Returns

FRANK SWITZER has resumed his duties with the Harrisonburg (Va.) Telephone Co. after spending nearly five years in the service of his country. At a recent board meeting of the Harrisonburg company, Mr. Switzer was made vice president and general manager and FRANK GOULD was made general auditor and assistant to the vice president.

Patent Issued on Push Button Telephone

Putting the automatic telephone on a push-button basis is undertaken in an invention on which Patent No. 2,394,926 has just been issued to Rudolph F. Malina of Hastings-on-Hudson, N. Y.

On the front of the new instrument are 10 keys arranged in two banks and numbered 1 to 0, like the keys of a small adding machine. Within the base, the mechanism is not very much different from that of the dial telephone, for each key is so geared that it turns a master-wheel a different number of spaces.

The inventor has assigned his patent to the Bell Telephone Laboratories.

V V

La Crosse (Wis.) Telephone Corp. Has Veteran Training Plan

In a full page advertisement appearing in the La Crosse *Tribune*, February 17, the La Crosse (Wis.) Telephone Corp. presented a complete story of its efforts to provide returned fighting men with the opportunity to become skilled telephone workers under the GI Bill.

The ad reveals that in September, 1945, the La Crosse company inaugurated a telephone training plan for veterans and thus became one of the first telephone companies to provide ex-servicemen with the opportunity to learn the telephone business under the provisions of the GI Bill.

The company now has 20 ex-GI's actively engaged in "on-the-job" training. Seventeen of the 20 are new employes and are being trained as linemen, cable splicers, combination men, testboard operators, central office equipment repairmen and plant accountants. Three of the veterans are former employes who have returned to their jobs from army service.

The training program is being carried out in preparation for a large scale telephone construction program which will begin as soon as materials are available.

V V

Walter Gifford Honored For Wartime Service

Walter S. Gifford, president of the American Telephone & Telegraph Co., New York City, was honored on February 17 at ceremonies in New York City for outstanding wartime service to the country.

Maj. Gen. Harry C. Ingles, chief signal officer of the Army, acting on behalf of President Truman, presented the Medal of Merit, the nation's highest civilian award, to Mr. Gifford. According to the citation accompanying the reward, Mr. Gifford, during the war made every effort to assure that the facilities of his organization were utilized to the maximum extent possible in the successful prosecution of the war.

"Not only did Mr. Gifford place the technical facilities of his company at the disposal of the Army," the citation read, "but he directed it in playing a major role in furnishing highly trained technical specialists to the Army through the affiliated plan."

This plan, the citation explained, provided civilian technicians to serve both as officers and enlisted men in forming the new Signal Corps units.

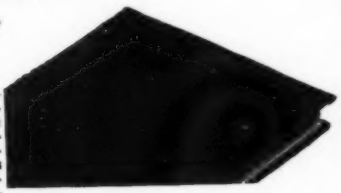
V V

Named Publication Editor

ROBERT S. SMITH of Albany, N. Y., has been appointed editor of the Indiana *Telephone News*, monthly magazine of the Indiana Bell Telephone Co. Mr. Smith has been associated with the Bell System since 1934 and formerly was associate editor of a publication of the New York Telephone Co. He succeeds ROBERT W. FAULKNER as editor.

What the COMMUNICATIONS WORKER NEEDS

to know about electricity



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THE ELECTRICAL FUNDAMENTALS OF COMMUNICATION

By A. L. Albert, Professor, Communication Engineering, Oregon State College; Professor, Electrical Engineering, Purdue University (1942-43); 550 pages, 6x9, 359 illustrations, $3.50.

Presents the electrical fundamentals of communication, including the three divisions—telegraphy, telephony, and radio with its allied branches. Starts with electronics, explains what the communication technician wants to know about direct current, conductors, resistors, insulators, and discusses such topics as the magnetic field and inductance and the electric field and capacitance solely from the point of view of the communication industry.

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THE PLANT MAN'S NOTEBOOK

BY RAY BLAIN • TECHNICAL EDITOR

SOME commercial concerns having a large volume of telephone toll service between certain points have adopted a novel plan of determining whether it is more economical to use commercial toll service or leased lines. The cost of all calls between the two points is computed at regular intervals, such as each 10 days, or by the month. If the volume is sufficient, one leased line is contracted for. Then calls are placed over this line when a delay of not more than 10 minutes is encountered. That is, the operator accepting the call will hold it for 10 minutes and if by that time she cannot place it over the leased line, she will place a commercial call. The cost of the commercial calls is computed at regular intervals and when a saving results, a second line is leased, and so on.

* * *

During 1944, the Bell Telephone Co. of New Jersey had 1,165 company cars which were driven a total of 8,722,493 miles, with only 62 accidents. A total of 140,685 miles was driven between accidents.

* * *

A small neon glow lamp now is available which, it is claimed, consumes only one cent's worth of electricity in one year's continuous operation. This marker would be ideal for use on all lighting switches and such an arrangement most surely would reduce accidents.

* * *

The new and modernized TelAutograph system provides a most valuable communication service when a quick, accurate written record is required. This equipment delivers instructions exactly as written to one or many points simultaneously. The TelAutograph is easy to use. Just flick the key and write. A permanent record appears at both sending and receiving points. Anyone who can write can use

The TelAutograph

the equipment and a specially trained operator is not required.

The TelAutograph proves a valuable auxiliary to any regular PBX telephone system. Regular telephone distribution circuits may be used for the connection of this system.

* * *

A new pillow speaker developed to bring entertainment to combat convalescents in army hospitals and to eliminate bothersome headsets, is now available for civilian use.

This electro-magnetic sound generating unit is designed for normal sound reproduction when placed under a pillow, or as a personal radio soft speaker. Thus, one may listen to a favorite radio program without disturbing an individual nearby who may wish to read or sleep. This arrangement will greatly enhance travel via train, bus, auto or plane.

This new unit combines beauty of design with excellence of performance. It is completely enclosed and presents a smooth continuous housing for the rugged apparatus within. Though weighing only five ounces, this speaker is so sensitive that it will perform on a very low audio voltage. Shock-proof and waterproof in its hermetically sealed, lustrous plastic case, the speaker can withstand extremely rough handling.

The vibrating sound generating surface is inductively coupled to the electro-magnetic structure and, in the absence of cemented connections, assures clear, rattle-free performance over a

The Pillow Speaker

long period of usage. This speaker will undoubtedly prove highly desirable and will replace the cumbersome headset for numerous communication needs.

The specifications of the speaker are as follows:

Diameter, 3⅝ inches.
Maximum thickness, 1-3/32 inches.
Weight, 5 ounces.
Impedance, 2,000 or 100 ohms.
Sensitivity, 5 milliwatts electrical input results in normal loudness through the average pillow.

? ? ? Plant Man's Quiz ? ? ?

The "Plant Man's Quiz" department is for your use. Send in questions on any troublesome problems you may have concerning plant construction, repair or maintenance and they will receive the expert attention of Ray Blain, our technical editor. Address your questions to Ray Blain, c/o TELEPHONY, *608 S. Dearborn St., Chicago 5, Ill.*

Q. Is a small air compressor considered suitable for use in pressure testing cable?

A. The ordinary air compressor is not considered suitable for cable testing due to moisture content of the air. However, there is a small, portable air compressor available which is equipped with a desiccant, air-drying attachment which is considered entirely suitable for flash testing of cable.

Q. We plan to pull in a 1,000-ft. section of 22-gauge, 900-pair, lead covered cable and would like to know whether or not we can purchase this amount in one length?

A. The standard reel length for this size cable is only 650 ft. It is true that you probably could obtain 1,000 ft. in one length, but it is doubtful that this could be pulled into the duct without injury. This type of cable weighs nearly nine pounds per foot and even if carefully lubricated and a core hitch used for attaching the winch line, a pull of 1,000 ft. would very likely prove a risk. It is recommended that the installation of a new manhole dividing the pull into two 500-ft. sections be considered.

Q. We have some old manhole covers which are only 21 ins. in diameter and these do not seem large enough for convenient use. What size cover is generally considered standard?

A. We do not have any information as to a standard size manhole cover; however, the smallest usually is 27 ins. in diameter, while a 30-in. size often is used. We believe that when large cables are installed, a cover at least 27 ins. in diameter should be considered necessary. We have seen cable splicers who would just be out of luck in attempting to enter through a 21-in. opening.

Q. How much time will be required for a seven-ampere fuse, of the type used in a subscriber's station protector, to operate on a seven-ampere current flow?

A. One type of seven-ampere fuse will carry seven amperes of current continuously, but will operate in less than five minutes on 10.5 amperes of current. This particular fuse is designed to operate before the heat from the current can overheat the protector.

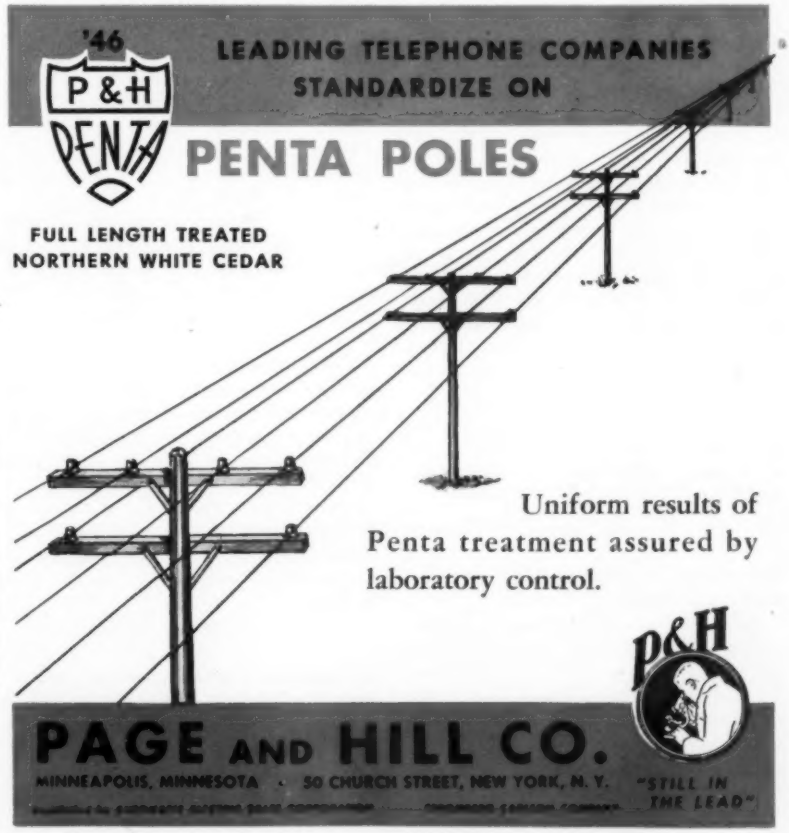
Q. Can you give us any information as to whether the distance of the speaker's lips from the telephone transmitter of a modern handset actually has a noticeable effect on the grade of telephone transmission?

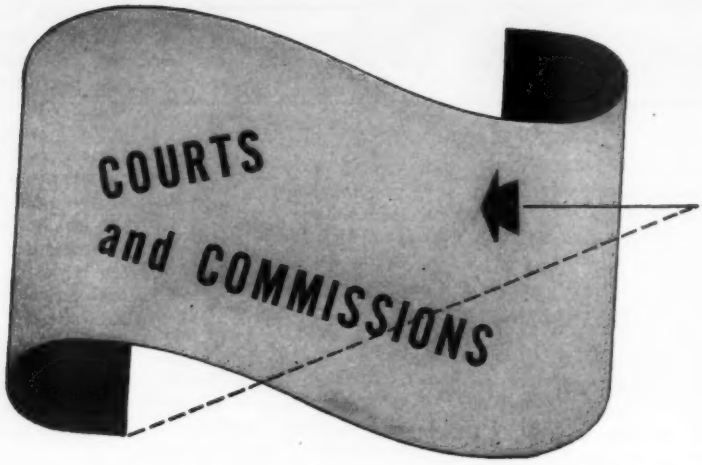
A. It is true that this difficulty is not as great with the handset as it was with the old candlestick desk stand although some transmission complaints are still traced to subscribers not speaking directly into the transmitter.

The efficiency of any transmitter decreases rapidly as the distance between the speaker's lips and the mouthpiece is increased. If subscribers could be made to understand this and speak properly into the mouthpiece the average grade of transmission undoubtedly would be increased considerably. It is not uncommon to find subscribers speaking at least four inches from the transmitter which may introduce a loss of over 12 db. Some claim that speaking about one inch from the transmitter causes a loss of 3½ db. It is generally agreed that proper position of the lips is about one-half inch from the transmitter. When the lips are placed too close to the mouthpiece there is a noticeable loss in articulation and clearness of speech which more than offsets any gain in volume.

Q. How can we determine when our switchboard plugs have worn to such an extent that they should be replaced?

A. A rough test can be made by placing a tone on a jack and moving the plug. In this manner, a cut-out can be detected instantly. The best practice, however, is to obtain a plug gauge from the manufacturer of your plugs. This tool can be used to determine what parts of the plugs are worn. There is a gauge for the tip, dead collar and sleeve. If the plug enters the gauge, it is worn to such an extent that replacement is required. Pressure should not be exerted to force the plug to enter the gauge.





New Consumer Tax Proposed in Missouri

A bill introduced in the Missouri Senate on February 18 proposes a 5 per cent consumer tax on telephone, gas and electric utilities for school purposes in the Kansas City school district.

Estimated to yield approximately $800,000 annually, the tax measure was introduced by Senators Edgar J. Keating and Frank L. Wilkinson of Jackson County.

The bill is an enabling act under which the school board would be authorized to submit the question of the tax to a vote of the people, with a majority required for its approval. Theoretically, the tax would be imposed upon the consumers and collected by the utilities, which in turn would remit the funds to the school district and make proper accounting. Industrial users would be exempted. Authorization would be extended to check the books of the utilities from time to time. A fee of 3 per cent of the total amount collected would be remitted to the utilities to cover their costs of collection for the first year, and 2 per cent thereafter.

While the bill as drafted applies only to the Kansas City school district, other school districts throughout the state could ask to be included.

V V

Telephone Company Charter Believed Valid

Central Union Telephone Co., predecessor to the Illinois Bell Telephone Co., in Champaign, Ill., is a corporation in good standing and has a life of 99 years dating from June 25, 1883, City Attorney Gail R. Fisher of Champaign recently was notified by Secretary of State Edward J. Barrett's office.

The city had sought the information after Illinois Bell had claimed that as the successor to the Central Union company it held the perpetual franchise granted by the council to the Central Union on July 23, 1887. Councilmen of Champaign have discussed the levying of a tax of $5 annually on each of Illinois Bell's poles in the city. They have expressed belief the city is entitled to considerably more free telephone service on the basis of an Illinois Municipal League report showing many communities in the state to be receiving such concessions from the utility.

Mr. Barrett's office wrote Mr. Fisher there is no evidence on file in Springfield establishing Illinois Bell as the successor and assignee of the Central Union company. The situation, Mr. Fisher said, apparently parallels that encountered last year in negotiations with the Illinois Power Co. on a new franchise. It was the utility's contention a franchise taken over from an earlier company and granted for the lifetime of that corporation was valid. Chapman & Cutler, a Chicago legal firm consulted by the city, held the franchise to be enforceable. Mr. Fisher said the next move by the city will be to determine whether the Illinois Bell is legally the successor and assignee of Central Union, thereby holding its franchise. Officials of Illinois Bell have promised the city engineers would be sent to Champaign to make a survey to decide whether there is a justification of additional free service for municipal agencies.

V V

Telephone Co-Ops Sought in Virginia House Bill

Extension of telephone service into rural areas in Virginia through co-operatives similar to those operated by the Rural Electrification Administration was proposed by a bill submitted to the Virginia House of Delegates February 16 by Delegate Robert Whitehead of Nelson, and three other House members.

Mr. Whitehead said his bill would amend the electric co-operative act so as to permit the formation of co-operatives to engage in the telephone as well as the electric business "either or both."

The 1940 census reported that 138,831 Virginia farms, or 85 per cent of the total, had no telephone service, he stated.

V V

Hotel Association Interested In Oklahoma Rate Hearings

The question of whether the Oklahoma Hotel Association should be permitted to intervene in a case brought on the initiative of the Oklahoma Corporation Commission to enforce the five-cents per call tariff authorized for hotels which provide telephone service to their guests, came up before the commission for a ruling at the hearing on February 21.

H. L. Douglass, attorney for the hotel association, presented a petition asking for permission to intervene in the event the association should decide on that course. The commission, after hearing its own witnesses, reserved its ruling on the intervention request until March 4.

Reford Bond, chairman of the commission, stated there is a legal question as to whether a party not directly a party to an application to enforce compliance with a telephone rate authorized for service furnished by a utility company, has a right to intervene in a rate case such as the one before the commission.

The commission had ordered the Southwestern Bell Telephone Co. to show cause why it should not require

hotels to comply with the regular tariff rate prescribed by the commission. This rate is five cents for each local telephone call put in by a guest through the hotel switchboard to an outside telephone.

The commission had received numerous complaints that some hotels were charging 10 cents each for such calls. In initiating the proceeding the commission chairman took the position that any charges made above the regular tariff rate should be billed to the guest by the hotel as a service charge and not as a part of his telephone bill.

John Cantrell, general counsel for the Southwestern Bell in Oklahoma, told the commission at the hearing that his company considers the five cents per call charge a just rate, legally made and that his client will not join in initiating any proceeding to change this tariff, if its reasonableness should become a direct issue before the commission.

V V

New York Mayor Requests Five Per Cent Utility Bill Tax

Mayor William O'Dwyer has asked state legislative authority to enable New York City to raise $142,000,000 of new revenue annually through a program of increased and new special taxes, including a levy of 5 per cent on telephone and other utility bills.

Telephone and telegraph companies in New York City are at present showing on bills a city sales tax.

Under the proposed O'Dwyer program, which was announced February 19 in Albany, where it is before the New York State Legislature, the authority for the existing and new municipal taxes would be granted to New York City for four years. The city's present emergency taxing powers have been subject to renewal from year to year. Both present and proposed new legislative authority would apply only to New York City, without affecting the taxing powers of other municipalities in the state.

V V

Commissioner Asks for Relief Of Tax Assessment Duties

The Tennessee State Railroad & Public Utilities Commission should be relieved of tax assessment duties, it was declared by Commissioner John C. Hammer in a recent letter to Gov. J. N. McCord.

Besides regulating utilities operating in the state, the Tennessee commission also fixes taxes. It recently increased the total assessment of Tennessee utilities from about $232,000,000 to approximately $318,000,000.

Revealing that he had made a personal survey of taxation procedures

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followed by other states, Commissioner Hammer said that from replies received from 43 states, "it can be seen that the regulatory commissions in only five states are required to make tax assessments, and Tennessee is the only state which does not have a tax expert or tax consultant as a member of its staff. In most states the assessments are made by the Department of Revenue or the State Tax Commission."

"In my opinion," Mr. Hammer declared, "regulation and taxation are not related, and no regulatory commission should be required by law or otherwise to assess for tax purposes any properties of the utilities they are required to regulate.

"In this respect our laws should be changed or amended. If the commission is to continue to act as tax assessor, which it is required to do under existing statutes, it should employ as a permanent member of its staff a tax expert or tax consultant."

V V

ICC Approves Rate Boost For Mt. Pulaski Company

The Illinois Commerce Commission on February 5 approved increased telephone rates in Mount Pulaski, Chestnut and Latham by the Mount Pulaski (Ill.) Telephone & Electric Co. Effective March 1, the rates are as follows:

Class of Service	*Net Annual Rates Present*	*Proposed*
MT. PULASKI		
Individual, business	$24.00	$36.00
Individual, residence	18.00	21.00
Two-party, residence	15.00	18.00
Rural, business	24.00	36.00
Rural, residence	18.00	21.00
CHESTNUT		
Individual, business	18.00	30.00
Individual, residence	18.00	21.00
Two-party, residence	15.00	18.00
Multi-party, rural	18.00	21.00
LATHAM		
Individual, business	18.00	30.00
Individual, residence	18.00	21.00
Two-party, residence	15.00	18.00
Multi-party, rural	18.00	21.00

V V

Oklahoma Independent Gets New Rates; Hear Two Others

The Oklahoma Corporation Commission has authorized new rates on company owned multi-party service through a metallic circuit at one Independent and will hear requests of two others for increased rates.

In a journal entry the commission authorized the Southwestern States Telephone Co. to install the multi-party service through a metallic circuit connected to its Meeker, Okla., exchange, at the rates of $2.50 per month for business and $1.50 per month for residence service.

Hearing is scheduled for March 13 on the petition of the United Telephone Co., at Haskell, Okla., for the following increased rates on conversion to common battery service:

Class of service	*Present rate*	*Proposed rate*
Business, one-party, wall	$2.50	Handset, $3.25
Business, one-party, desk	2.75	Handset, 3.25
Business, one-party, hand	2.90	Handset, 3.25
Residence, one-party, wall	1.50	Handset, 2.00
Residence, one-party, desk	1.75	Handset, 2.00
Residence, one-party, hand	1.90	Handset, 2.00
Residence, two-party, hand		1.75

Proposed rates are conditional upon installation of common battery service with handset equipment to be furnished to each city subscriber. Proposed rates are agreed to by 92 per cent of the subscribers.

The application of the Sharon (Okla.) Telephone Co. for the following higher rates will be heard March 27:

Rural lines, with company owned line and poles, from $1.00 to $1.25 per month; rural lines where the line and telephones are owned, from $1.25 to $1.50 per month.

V V

Seeks to Build Telephone Line Across Lake

The Carolina Telephone & Telegraph Co., Tarboro, N. C., is seeking permission from the Federal Fish & Wildlife Service to construct a telephone line across Matamuskeet Lake in eastern North Carolina to serve the community of Fairfield, which is now without telephone service.

The regional office of the service in Atlanta has objected to installation of the line on grounds that it would present a hazard to wildfowl on a scenic highway constructed across the lake.

Ira Gabrielson, director of the service, has advised Rep. Herbert C. Bonner (D., N. C.) in Washington, D. C., that a plan to permit construction of the line soon will be worked out.

V V

Better Service Sought by Two Oklahoma Independents

A petition asking that the town of Putnam and surrounding area in southern Dewey County, Okla., be declared open territory has been filed with the Oklahoma Corporation Commission, and hearing has been set for March 20.

The town has 100 residents and only seven telephones now are connected to the exchange. The petition stated the subscribers recognize that the business of the exchange does not justify it in improving its lines which are in very poor condition.

The petitioners stated the Western Light & Telephone Co. is willing to take over the territory and give Putnam subscribers service through its Thomas, Okla., exchange, if so authorized by the commission.

Heard the same day will be applications of subscribers of the Southwestern States Telephone Co., at Moore and Jenks, Okla., for a commission's order requiring the company to give "adequate" telephone service at both exchanges. They request either common battery or dial service.

Moore is about nine miles south of Oklahoma City and Jenks is 15 miles southeast of Tulsa.

V V

Summary of Commission Rulings and Hearings

California Railroad Commission

February 15: Granted Los Gatos (Calif.) Telephone Co. authority to modify directory advertising rates and conditions.

Kansas Corporation Commission

February 20: Advisement pending in matter of Hanston (Kan.) Telephone Co. refiling telephone rates.

March 4: Hearing on application of Esbon Telephone Co. and Peoples Telephone Co. for permission to cease operating free lines at Esbon and Lebanon.

March 4: Hearing on application of McLeod County Telephone Co. for authority to raise rates and install dial service at Buffalo Lake.

March 4: Hearing on applications of Ross Gault for permission to transfer franchise and cease operating at Glen Elder, and D. R. Cunningham for authority to do business there.

March 11: Hearing on applications of Fulton (Kan.) Telephone Co. for permission to transfer franchise and cease operating as public utility, and of Howard T. Pickett, Jr., for certificate of convenience and authority to do business there.

New York Public Service Commission

February 25: Hearing on petition of Mary S. Chambers and Aileen Sheldon, administratrices of estate of Royal S. Chambers, for authority to sell Nicholville (N. Y.) Telephone Co. to Mildred Matthews.

Oklahoma Corporation Commission

April 1: Hearing continued on application of Fred Barrett to require Oklahoma Automatic Telephone Co. to restore and improve service at Clarita.

Utah Public Service Commission

May 13: Hearing on intrastate toll rates of Mountain States Telephone & Telegraph Co.

70 Years of Telephone Progress

(Concluded from page 16)

cities and other causes came the development of the nationwide toll system by the Bell. And in the progress made in extending the limits of long distance telephony, it is interesting to note that the fundamental inventions were originated by men outside the Bell organization.

The Bell spent thousands of dollars for the rights to control the Pupin loading coil patents, although its practical development was made by Bell engineers. The De Forest three-electrode vacuum tube was first used in radio and rights for its application to the telephone art were purchased by the Bell. Its development by Bell research men gave a great impetus to long distance telephony.

But in order to operate these two inventions — the loading coil and the vacuum tube — successfully over long distances, a two-way repeater circuit was essential and the Bell paid Elwood Grissinger, an Independent engineer, one-half million dollars for a circuit which was first tried out in the Independent field. The repeater was shown at the National Independent convention in Chicago in February, 1912. Its circuit is the basis of the success of the present day long distance service.

Multi-channel telephony and telegraphy was the invention of Maj. Gen. George O. Squier in 1910. His fundamental patents on wired wireless or carrier were dedicated to public use.

Independent long distance systems were attempted several times, but failed, due largely to financing difficulties and the fact that satisfactory service to distant points could not be maintained because of the Bell holding the fundamental patents on necessary equipment and not permitting their use by the Independent manufacturers. Throughout the years Bell has kept control of these fundamental patents, thus maintaining a monopoly of the long distance lines of the country. These fundamental patents expired several years ago.

Thus the amazing development of telephone communication in the United States has been brought about by the coöperation of the Bell System and thousands of Independent operating companies and Independent manufac-

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turers. The telephone industry has become the third largest public utility in the United States with an investment of over six billion dollars—$5,702,000,000 Bell, $733,000,000 Independent — and gives employment to hundreds of thousands.

The Spirit of Service

Its influence has been far reaching. It broke the isolation of farms, increased the number of business transactions and speeded the tempo of modern life. Its importance to special industries such as newspapers has been of inestimable value. It has tended to break down state lines and to increase international contacts. It has been of aid in safety, in transportation, in war and fighting crime.

From what has been called the "world's most valuable patent," no single person or group of individuals, it is stated, have made a large fortune. Yet the business collects more than one billion dollars a year from the American public which pays for reliable, rapid and accurate communication.

Since Doctor Bell's first telephone message 70 years ago, the progress of electrical transmission of speech and the expansion of the telephone industry have been more than simply the onward movement of a great commercial enterprise. The progress has been tinged throughout with idealism — an idealism which every member of the telephone industry's personnel in high and low positions feels and knows as the *Spirit of Service*, a spirit that pervades the whole personnel through all of its contacts with the public.

Telephone history may be complete with the romanticism of the knight errant and the patient zeal of the ancient alchemist, but outstanding in the 70 years just ending has been the constant aim of the entire industry to give the best possible telephone service with full emphasis placed on the importance of such intangible but very real elements as *Courtesy, the Spirit of Helpfulness, the consideration of the needs of individual subscribers and the constant use of the human touch in dealing with subscribers.*

The telephone has been developed out of nothing, by wresting from nature's boundless stores her hidden secrets and applying them to the problems of speech transmission. The future is assured, for lying outside the boundaries of our present knowledge, away off in the infinite, is a store of resources which will be moulded to the use of mankind by the scientific and engineering minds of the telephone industry.

W. J. Herrman Joins Commonwealth & Southern

Walter J. Herrman, vice president of Telephone Bond & Share Co., has resigned from the Gary Group to become associated with the Commonwealth & Southern Corp., to handle rate matters and related problems. Mr. Herrman is probably best known in the telephone industry for his work on the United States Independent Telephone Association Toll and Settlements Committee, which has strived continuously for a more equitable allocation of the revenues from joint toll operations.

W. J. HERRMAN

The smaller companies benefited from the USITA committee's introduction in 1943, of the two-part commercial toll compensation schedule which already has served to bring many extra millions of dollars into the tills of the small, high-cost and unprofitable exchanges. In 1944, the toll committee developed a new standard contract and compensation schedule for use among the Independent companies themselves, the general effect of which was to increase further the revenues of the small Independent participating carriers. Mr. Herrman did much of the preliminary and preparatory work leading up to the adoption of these schedules.

During the last two years, Mr. Herrman has been active in studying another important toll compensation matter—the division of toll-line revenues. In studies he has prepared for the USITA toll committee, Mr. Herrman shows that the long-haul volume traffic of the Bell System tends to produce large operating profits, while the short-haul feeder traffic carried by most Independent companies is frequently handled at an actual out-of-pocket loss. After protracted negotiations with the AT&T this problem is now nearing a

practical solution which may be announced to the industry in the next few weeks, it is understood.

Mr. Herrman has arranged to continue as member of the USITA toll committee, pending settlement of this important subject.

Following graduation from the University of California in 1922, Mr. Herrman went to Pittsburgh with the Westinghouse Electric Co. for two years, later returning to the Pacific Coast for the Great Western Power Co. of California. In 1933, he helped to organize the investment firm of H. R. Baker & Co., and was for several years thereafter manager of the company's Southern California offices. During this same period he frequently was called upon to testify as an expert witness in utility rate proceedings, and in 1937 and 1938 was employed by the Federal Communications Commission as a financial consultant in connection with the telephone investigation.

He joined the Gary Group in 1941 and was elected vice president of Telephone Bond & Share Co. and Continental Telephone Co. in 1942.

V V

OBITUARIES

J. E. FRISK, 76, owner of the Terral (Okla.) Telephone Co., died February 17 as a result of injuries sustained when he fell from a telephone pole.

Mr. Frisk had owned and operated the Terral exchange for more than 30 years. Before going to Oklahoma he was employed by the Southwestern Bell Telephone Co., at Dallas, Texas. He is survived by his widow.

* * *

E. J. FLYNN, 41, an attorney for the Southwestern Bell Telephone Co. at Oklahoma City, Okla., died January 27 of a heart attack.

He had been a member of the law firm of Cantrell-Carey-McCloud in the telephone headquarters building for the past four years. Prior to that he was employed in the commercial department of Southwestern Bell and also was district manager of the company at Alva, Guthrie and Norman. He is survived by his widow.

* * *

J. E. MORBACK, 79, who was instrumental in the organization of the telephone company at Sherwood, Ore., now an exchange of the West Coast Telephone Co., Everett, Wash., died February 5 at his home in Sherwood. He had been ill for two years.

Mr. Morback served as mayor of Sherwood for 30 years. He is survived by his widow, three daughters, six grandchildren, a brother and two sisters.

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The CHURCHILL TELEPHONE BOOTH

An Invitation to Use the Pay Station

Operating companies have found the **CHURCHILL** No. 100 Folding Door Telephone Booth a builder of pay station business.

It is constructed as a single unit and equipped with a reinforced back panel for mounting a wall telephone or coin collector.

The **CHURCHILL** Booth is made of selected white oak and is available in light or medium oak in a satin finish.

Included as standard equipment are electric light and automatic electric ventilator.

Overall height is 84¾"; width, 29"; depth, 30½". Shipped knocked down and crated.

Illustrated literature available.

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National Electric Moves Offices on May 1

The general offices of National Electric Products Corp., Pittsburgh, Pa., will occupy the entire thirteenth floor of the Chamber of Commerce Building, 411 Seventh Ave., on and after May 1.

This move was made necessary by the Veterans Administration's recent acquisition of the Fulton Building at 107 Sixth St., where National Electric had maintained general offices for the past 40 years.

V V

J. F. Jaap Is Vice President Of Cook Electric Company

John F. Jaap, who has been associated with Cook Electric Co. for 32 years and is well known to the telephone industry, was elected a vice president of the Cook company at its recent directors' meeting.

At the annual stockholders' meeting of Cook Electric Co., on January 28, 1946, the following directors were elected: A. D. Edwards, G. P. Edwards, A. H. Edwards, W. C. Hasselhorn, J. S. Baker, C. E. Lundeen and K. M. Fiske.

JOHN F. JAAP

At the subsequent directors' meeting, the following officers were elected:

Mr. Hasselhorn, president; Mr. Baker, first vice president; Mr. Jaap, second vice president; Mr. Lundeen, secretary-treasurer; Chester Ruth, assistant secretary, and K. E. Gundersen, assistant treasurer.

V V

Two-Way Teletype Talk Between U. S. and Paris

Two-way teletype conversations between the State Department and the American Embassy in Paris were opened February 20 over the longest direct line in the history of commercial telegraphic communication. It represents the first direct commercial communication of the United States with the continent of Europe by cable.

Formerly London was the only transatlantic point with which direct communication was possible. Installation of the direct link with Paris eliminates two intermediate relays in New York and London, thereby speeding communication with Paris and other places on the continent.

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C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

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